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*Congress. House. Committee on Appropriations*  
**HEARINGS**

BEFORE THE

**SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,**

**HOUSE OF REPRESENTATIVES,**

CONSISTING OF

MESSRS. HEMENWAY, LITTAUER, GARDNER, OF MICHIGAN,  
M'RAE, AND BELL,

IN CHARGE OF

**THE FORTIFICATION APPROPRIATION BILL.**

WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1903.



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## FORTIFICATION APPROPRIATION BILL.

HEARINGS CONDUCTED BY THE SUBCOMMITTEE, MESSRS. J. A. HEMENWAY (CHAIRMAN), L. N. LITTAUER, W. GARDNER, T. C. McRAE, AND JOHN C. BELL, OF THE COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES, IN CHARGE OF THE FORTIFICATION APPROPRIATION BILL.

SATURDAY, *January 24, 1903.*

### STATEMENT OF MAJ. FREDERIC V. ABBOT, ASSISTANT CHIEF OF ENGINEERS, U. S. ARMY.

Mr. HEMENWAY. We asked for revised estimates, giving us the amount we ought to appropriate upon your full estimate, which was based upon \$4,000,000 for construction of gun and mortar batteries, for two-thirds, one-half, and one-third of the total estimate. Now, taking your estimate based upon one-half, you have estimated for construction of gun and mortar batteries \$2,236,000?

Major ABBOT. Yes, sir.

Mr. HEMENWAY. Then you have for installation of range and position finders \$223,500, and for searchlights for harbor defense \$223,500. We gave you, 1902, 1930, \$150,000 each year, making \$300,000 for the purchase and installation of searchlights.

Major ABBOT. Yes, sir.

Mr. HEMENWAY. Had that money been expended?

Major ABBOT. The \$150,000 for New York has been entirely expended. That was a special appropriation. The \$150,000 for the general searchlight installation is now all of it pledged—most of it. About \$60,000, I should say, has been spent, and the other is under contract.

Mr. HEMENWAY. New York Harbor is complete with the \$150,000 you had?

Major ABBOT. Yes, sir; it is complete in this way, that we have provided all the searchlights and the plants to run them, but at the time of the maneuvers up there in Long Island Sound those searchlights were loaned for maneuvering purposes for the forts at the eastern entrance of Long Island Sound. As a result of those maneuvers the artillery and the engineers came to the conclusion that for a complete installation for the darker nights it is necessary to use a larger type of searchlight than any that has been provided in New York Harbor for certain locations there, and some of those searchlights purchased for New York Harbor have now been left in the Long Island district and will be replaced out of the general fund with a larger size to put in New York Harbor.

This is the initial step in the application of searchlights to night defense in this country, and we did the best we could in the start. We thought the 36-inch, which was the biggest light manufactured at the time, would be as large as necessary, but its range is only about half that of a 60-inch light, and it enables vessels to get very near the batteries, and they move so rapidly they remain under fire a much less time than they would with the 60-inch light. It takes a certain length of time to hit a ship, and consequently by using a 60-inch light to pick out an advancing vessel we will have them under fire for that much longer period than by using the 36-inch light. The 36-inch lights bought for New York Harbor will be perfectly useful applied to other points, because they have to hit a ship after it is found. It does not require half as much light as to pick it out of the darkness.

There are two kinds of lights we install now—the searchlights of the highest power and battery lights, which are put upon a ship when it is found by the brighter light, which illuminates it enough for the range finders to follow the ship by. It is very easy to see a thing after you have once seen it and to keep your eye on it, but to pick it out of the darkness in the first place requires a high degree of illumination, and therefore we will have in New York to replace some of these 36-inch lights with the 60-inch lights, and the 36-inch lights in New York will be placed at some other harbors to take the place of battery lights.

Mr. HEMENWAY. They are constantly improving these lights?

Major ABBOT. Yes, sir.

Mr. HEMENWAY. Now, I notice for torpedoes for harbor defense in the estimate you have \$100,000. You have now a fairly good stock of torpedoes for harbor defense?

Major ABBOT. Yes, sir; those were all transferred under the act of September 2, 1901, to the artillery, and under the wording of the last fortification bill they purchase the torpedo material and we are limited to the construction of the casemates, the cable batteries, cable tanks, the construction of torpedo storehouses—engineering construction in general, in other words.

Mr. HEMENWAY. Now, as to the casemates and cable galleries, torpedo storehouses, etc. Are you fairly well provided?

Major ABBOT. Yes, sir; at most of the important harbors we have casemates from which the mines can be operated. The system has been developed of late years so it requires more room than the original type. Formerly the mines were fired by a regular primary battery. The advance in electrical science has been so that you can do it better by secondary batteries than by primary batteries, and that involves an oil engine and a generator and charge and storage batteries, which require two additional rooms in the casemates; so in the earlier harbors, which we supplied first, these mine casemates have to be increased in size or else the methods of charging the batteries are very crude and troublesome. The batteries have to be taken out and charged somewhere else and carted back again.

Mr. HEMENWAY. But there is a constant improvement in this matter of defense?

Major ABBOT. Yes, sir.

Mr. HEMENWAY. And there is danger of buying too much material in view of the improvement that is likely to continue?

Major ABBOT. Yes, sir; that is undoubtedly true, but on the other hand there is a danger of being caught at some place without any torpedo defense when it will be needed very badly.

Mr. HEMENWAY. During our Spanish-American war within ten days or two weeks after General Wilson was notified to go to work he had the harbors fairly well defended?

Major ABBOT. Yes, sir; there is no question about that, but at the same time some of them were defended in such a way that a really strong attack would have knocked out the operating casemates. They were in temporary houses.

Mr. HEMENWAY. But they are a little timid about going up over submarine mines, I believe?

Major ABBOT. Yes, sir; beyond question.

Mr. LITTAUER. Where are these casemates placed? They need not be in the immediate vicinity of the mines field?

Major ABBOT. Except on account of the cables; that the less electric cable you have exposed to being shot away the safer you will have your mine system from being interrupted.

Mr. LITTAUER. They generally build them near the shore?

Major ABBOT. If you can not get a place that is covered.

Mr. LITTAUER. What do you mean by pretty near the shore?

Major ABBOT. Right on the shore if they can get it, because the cables can lead from the water into the casemates; and if it is a long way inshore, you have to put ducts, like you do on your street railroads, to lead the cables through. The cables are large in number and require a large gallery and are expensive. For instance, at Fort Moultrie, although that is quite near the shore, the estimated cost of the cable gallery there is \$6,000—as much as we pay for a torpedo storehouse in most harbors.

Mr. HEMENWAY. You get as close to the shore as you can?

Major ABBOT. Yes; and find protection. It depends upon the locality.

Mr. HEMENWAY. I notice that sites for fortifications and seacoast defenses in your estimates, based upon the one-half amount asked for, is half a million dollars.

Major ABBOT. Yes, sir.

Mr. HEMENWAY. You have been having \$200,000 for the last three years, and prior to that time \$300,000, and at one time \$500,000; how much of this money have you on hand now?

Major ABBOT. We have practically disposed of all of it at the present time. My statement comes to the 31st of January, and we have made an allotment since that time, and we are practically exhausted. We have to estimate how much is required by condemnation suits; and if they are condemned at the rates we believe we will have to pay, we have not over \$15,000 or \$20,000 available for anything.

Mr. LITTAUER. In your estimate here you ask for the construction of gun and mortar batteries, including defenses for our island possessions?

Major ABBOT. Yes, sir.

Mr. LITTAUER. You ask for \$4,000,000, and you ask if you are to have only half of that amount, \$2,236,000. Would that one-half amount include any of the defenses for our island possessions?

Major ABBOT. We endeavored the last session of Congress to get the words "including defenses for our insular possessions" inserted in the bill. Congress made no appropriation for that purpose; consequently this year we omit from our estimate those we sent in last year "for the purchase of land for the defense of Pearl Harbor," etc.—

Mr. LITTAUER. You have the general language?



Major ABBOT. We have asked to have it put in; and when Congress authorizes us to go ahead, then we can apply some of these funds we propose to put in this country to the foreign work.

Mr. LITTAUER. Does your estimate of \$4,000,000, or, if the one-half estimate is given, \$2,236,000, include any work to be done on any island?

Major ABBOT. No, sir; not unless Congress inserts those words, "including defenses for our island possessions," and in that connection in our annual report we make a strong plea for the creation of a board, similar to the Endicott Board, to decide what the policy of the country at large should be with reference to the defense of our foreign possessions, coaling stations, naval bases, and so on throughout the world, and upon the basis of the report of that board a subdivision of allotment of the funds which we ask, the \$4,000,000 if we should be allowed the whole of it, or \$2,236,000 if we should have half the estimate, would be applied in this country and to our foreign possessions, according to the recommendations of that board.

Mr. GARDNER. Unless the italics, "including defenses for our island possessions," are inserted you can not expend this money on our island possessions?

Major ABBOT. We consider we are prohibited from expending the money in our foreign possessions.

Mr. HEMENWAY. We will go to the next item—plans for fortifications. We gave you \$5,000, and that is what you ask for?

Major ABBOT. Yes, sir.

Mr. HEMENWAY. Preservation and repair of fortifications, you ask for \$300,000. That you ask for in any event?

Major ABBOT. Yes, sir; that is one of the most desperately needed of all the appropriations here. We have got so many of these fortifications now built that to keep the iron work from becoming rusty, to keep them painted, to keep everything in a thoroughly serviceable condition \$300,000 is the least estimate on which we can get through.

Mr. HEMENWAY. Supplies for seacoast defense?

Major ABBOT. We ask for \$10,000 because we have issued so many more electric plants during the year, and it will be required.

Mr. HEMENWAY. That you want in any event, whether the large or small amount is appropriated?

Major ABBOT. Yes, sir.

Mr. HEMENWAY. Sea walls and embankments. On the one-half proposition you wish \$89,575; that is your estimate?

Major ABBOT. Yes, sir.

**STATEMENT OF GEN. WILLIAM CROZIER, CHIEF OF ORDNANCE,  
U. S. ARMY, ACCOMPANIED BY CAPT. E. B. BABBITT.**

Mr. HEMENWAY. Will you turn to page 7 of the bill before you? In the current law the money under the item, for the purchase of submarine mines and necessary appliances, etc., was expended by the Artillery Corps?

General CROZIER. Yes.

Mr. HEMENWAY. It is suggested now that the expenditure of this money be placed under the Ordnance Department?

General CROZIER. Yes; but that is solely for the purposes of accounting and administration. I talked it over with the Chief of Artillery and the Secretary of War. The Secretary does not wish to have another accounting bureau in the War Department, with a multiplication of clerks, etc.

Mr. HEMENWAY. This will avoid another accounting bureau there and serve the purposes just as well?

General CROZIER. Yes, sir. When they need material of that sort the officers concerned will make known their needs to the Chief of Artillery and he will forward them to me with his approval, indicating what he wants purchased, and I will use the machinery of the Ordnance Department, which is already in existence, for effecting the purchase and accounting for the money and afterwards for accounting for the property. That is all that the wording is intended to accomplish; the initiative remains with the artillery. We have already all this machinery in existence for making the purchases and accounting for the money, and I have designated an officer at the torpedo school, an artillery officer, as disbursing officer under the Ordnance Department, and he follows the same methods that every other officer does in making disbursements and accounting for the money.

Mr. HEMENWAY. Now, in regard to this item for the purchase of submarine mines and necessary appliances, etc.

General CROZIER. I do not make that estimate.

Mr. HEMENWAY. I want to ask this question. They are constantly improving these plans for submarine mines and the machinery and appliances necessary for manipulating them?

General CROZIER. Yes; that is presumable, but things do not become obsolete even when they are improved upon. There is always a place for them at less important ports. We never will have enough on hand of anything of the latest model, because improvement is constant.

Mr. HEMENWAY. Improvement is so constant that necessarily the materials you buy—

General CROZIER. Are changing.

Mr. HEMENWAY (continuing). Are changing.

General CROZIER. But whenever there is an improvement we do not try to immediately get a full supply of the improved material. We always use material until it is out of the question to use it any longer.

Mr. HEMENWAY. Turn to page 9 of the bill, "For finishing and assembling 8-inch, 10-inch, and 12-inch guns at the army gun factory, including new firing attachments for guns now in service and any new tools or machinery necessary for their manufacture." Why do you add that verbiage?

General CROZIER. That is also partly for the same reason. The processes of manufacture are improving continuously. One element in which improvement is most imminent is that of the use of electricity for working the larger machines. This becomes particularly desirable in view of the fact that our work on the larger guns for the seacoast armament is slacking away, the appropriations for it are diminishing, and consequently we are not running all of our large machines.

Mr. LITTAUER. That is because they are fairly well emplaced already?

General CROZIER. Oh, yes; we have made very good progress with the heavy armament, and consequently we are not running to the full capacity. Now it becomes economical to use electric machines to run some of the larger tools, and the practice is becoming rather general.

Mr. HEMENWAY. Out of what appropriation have you heretofore bought your machinery necessary for the manufacture of these guns?

General CROZIER. We have sometimes had special appropriations for the purpose, and we have sometimes bought it out of the general

fund for repairs and improvements of arsenals. We have sometimes had an appropriation for building an experimental gun, such as the 16-inch gun, and the appropriation for that has paid for certain special fixtures which were necessary for that gun.

Mr. HEMENWAY. You think it is advisable to have this change in language here?

General CROZIER. I think it is; yes, sir.

Mr. HEMENWAY. And under your plan for one-half of the appropriation—that is, taking the \$1,000,000 for construction of gun and mortar batteries as a basis—we have asked you to make estimates along four different lines. Now, take the estimate for one-half?

General CROZIER. Yes. It brings this estimate down to \$80,000. It evidently has not been reduced one-half, because we have already got the forgings, which must be worked up, etc., and some other items have been reduced more than half.

Mr. HEMENWAY. In this statement you give us here you keep this appropriation well balanced, so you have carriages for the guns when they are completed?

General CROZIER. Yes.

Mr. HEMENWAY. And you keep the general work balanced up?

General CROZIER. We keep the guns and carriages and emplacements running along together. We have to consult with the engineers in order that the guns and carriages shall balance the emplacements.

Mr. HEMENWAY. Now, in regard to the second item, for oil-tempered and annealed steel for coast-defense guns, you suggest that we strike out the words "oil-tempered and annealed." Do you want that stricken out or left in there?

General CROZIER. It is perfectly useless; that is the only reason for striking it out. Of course, we do not buy anything but oil-tempered and annealed steel. They used to put a lot more language in, "subject to inspection at every stage of manufacture," and all that sort of thing; it simply lumbers up the bill and means nothing, as we always do that anyway.

Mr. HEMENWAY. Now, do you want this limit of 21 cents a pound continued?

General CROZIER. There is this to be said about that. The use of nickel steel is looming up very prominently. We use it now for small guns. It is considerably stronger than the other kind, but it costs more. The manufacturers say it costs 9 cents a pound more. The line of improvement in gun construction seems to lead in the direction of greater strength for the gun. We have improved the powder very much of late years, and that has enabled us to lengthen out the gun, so as to get the advantage of the longer continued push that the better powder can give, to as great a degree as the handiness of the gun and its transverse stiffness seem to permit.

Now, improvement seems to lie in the direction of greater strength for the gun than we have been able to give before. In the comparative recent past we have improved the strength of guns by improving the theory of construction, and I think we have about reached the limit of that. The theory of gun construction is so well understood now that there does not seem to be much room for increase of strength by any improvement of the theory. What we are being led to now is improvement of the material.

Mr. LITTAUER. I would like to ask a question as to the wire-wound guns. Have you given them up?

General CROZIER. No; we have not given them up—that is, the idea has not been given up. The nickel steel is about 15 per cent stronger than the steel that is not nickel steel. There is an opportunity to use a higher pressure, and consequently to get more power out of the gun. The manufacturers say it will cost about 9 cents a pound more than the other.

Mr. HEMENWAY. Now, under this limitation, you are virtually prohibited from purchasing nickel steel?

General CROZIER. Yes.

Mr. LITTAUER. Have you ever asked for bids that were not accepted under this limitation?

General CROZIER. No; we have not.

Mr. LITTAUER. Did you ever ask for bids on nickel steel?

General CROZIER. Not unless we have had some special appropriation to cover it. We have never asked for nickel steel under this appropriation. We have known that it would be useless.

Mr. LITTAUER. What manufacturers make steel of this character?

General CROZIER. If it is for heavy guns, the Bethlehem Steel Company and the Midvale Steel Company.

Mr. HEMENWAY. What have you paid for the nickel steel which you have bought from special appropriations?

General CROZIER. We have bought it for smaller guns and the price has run up pretty high.

Captain BABBITT. Forty-five cents.

General CROZIER. Those were some small forgings. The prices have been larger than would result from the increase of 9 cents per pound which I spoke of. We have sometimes paid as much as 60 cents.

Mr. HEMENWAY. Do you think if we provided here for the purchase of a limited amount of nickel steel and fixed the sum at 30 cents that that would do?

General CROZIER. That would cover the case. If you wished to make the phraseology more simple, you could leave in there—

Mr. LITTAUER. Nickel steel is oil-tempered and annealed steel?

General CROZIER. Yes, sir. "Shall be made at a price not exceeding 21 cents per pound, except for nickel steel." You may leave it open in that way. The manufacturers have already told me 9 cents per pound more is all they would ask.

Mr. LITTAUER. Do you think if we made the price for the regular steel less than that you could still buy it?

General CROZIER. I think you can make as good a guess as I can on that.

Mr. LITTAUER. In any event, you always buy this steel from the lowest bidder?

General CROZIER. Yes, sir; there are only two bidders for these large guns, and they usually combine.

Mr. GARDNER. If you limit the appropriation to 30 cents it will mean 30 cents?

General CROZIER. If it were limited to 30 cents I would pay the full amount; and will probably pay the full amount anyway.

Mr. HEMENWAY. If we do not limit you, you would have the chance to buy it for less?

General CROZIER. Possibly, but as there are only two bidders they will combine, and it will be 30 cents, I am satisfied.

Mr. HEMENWAY. How would it do to simply add the words "except for nickel steel?"

General CROZIER. Very well.

Mr. LITTAUER. Do you expect to be compelled to buy nickel steel during the coming year?

General CROZIER. Yes; indications are we will have to go to nickel steel. I have no objection at all to your adding words saying that the limit in price shall be 30 cents per pound.

Mr. HEMENWAY. If you can buy at 30 cents per pound and there is a possible chance of getting it for less I see no reason why we should not let you try to do it and limit next year.

General CROZIER. Well, that can be done.

Mr. HEMENWAY. You may be able to drop the price below 30 cents per pound.

General CROZIER. Yes; but information which I have would seem to indicate that about 9 cents per pound more is something like the increase in the cost of the material.

Mr. HEMENWAY. I was just going to ask you that question. In your opinion the 9 cents per pound for nickel steel is about equal to, 21 cents per pound for steel that is not nickel steel?

General CROZIER. Yes; from the best information we have.

Mr. HEMENWAY. What would you call the other steel?

General CROZIER. Ordinary gun steel, I call it; but that name will not last long, because nickel steel will become ordinary gun steel.

Mr. GARDNER. Why not strike out of the proviso "Provided, that no contract for oil-tempered and annealed steel for high-power coast-defense guns and mortars, etc.," the words "for oil-tempered and annealed steel" and put in "except for nickel steel?"

General CROZIER. That would be all right.

Mr. GARDNER. I mean to strike out "oil-tempered and annealed," so as to conform to that just above.

General CROZIER. Yes, for it means nothing. When anything new comes along it is the practice to particularly describe it, and after a while it becomes current and established, but your bills have continued to carry it.

Mr. HEMENWAY. Then, as I understand you, "oil-tempered and annealed" does not mean anything?

General CROZIER. Does not mean anything at all.

Mr. GARDNER. All steel is oil tempered and annealed whether you put those words in or not?

General CROZIER. Yes.

Mr. HEMENWAY. Now, this estimate of \$250,000 is estimated to purchase 12 sets of forgings for 10-inch guns. Sixty-one thousand dollars would buy what?

General CROZIER. Sixty-one thousand dollars will buy two of nickel steel and provide for the expense of inspection.

Mr. HEMENWAY. You think the \$61,000 will be sufficient under the one-half principle?

General CROZIER. Yes, sir; it will be sufficient under that.

Mr. LITTAUER. Is that estimate made on a basis of 30 cents per pound for the forgings?

General CROZIER. Yes, sir; it was made on the basis of 30 cents per pound for the forgings.

Mr. HEMENWAY. Now, we had in last year's bill a proviso that no money appropriated by this act shall be expended for disappearing carriages, etc. Do you want that stricken out this time?

General CROZIER. The action which was contemplated there has been taken, and the result has been the report of the board referred

that the disappearing carriage is a proper one for use in the coast defense. That is the condition on which this estimate has been made. Mr. HEMENWAY. Now describe to us briefly what has been done in the matter.

General CROZIER. You will note that legislation of last year required that a board of officers, including also one civilian mechanical engineer, should pass upon these carriages, making up their minds as the result of a test of not less than 30 shots fired with full charges from a 10-inch gun mounted upon a disappearing carriage, as rapidly as possible. That board was appointed. The membership of it was composed of officers of the Army, an officer of the Navy, and a civilian.

The board fired not only 30 rounds from a 10-inch gun upon a disappearing carriage, but also 30 rounds from a 10-inch gun mounted on an ordinary barbette carriage, and in addition 10 rounds from 6, 8, 10, and 12 inch guns mounted upon both barbette and disappearing carriages. For the purpose they visited five different posts, in order to find all of those different classes of guns mounted, and the guns were fired by the artillery troops constituting the garrisons of the fortifications visited. As a result the board gave it as its opinion the principle embodied in the disappearing carriage made it an instrument admirably adapted to its purpose. Their report was completely favorable.

Mr. HEMENWAY. Where can that report be found, and who constituted that board?

General CROZIER. The report will be published as an appendix to the report of the Chief of Ordnance for the current year. A copy of it can be obtained by application to the Secretary of War. The board included an officer of engineers, an officer of ordnance, three officers of artillery, a naval officer, and a civilian. The names of the officers of artillery were: Colonel Randolph, chief of artillery; Major Cummins and Captain Coffin; of the engineers, Major Knight; of ordnance, Major Shaler; of the Navy, Captain Leutze, in command of the naval gun factory at Washington; and the civilian member was Mr. Freeman, of Providence. The recorder of the board was Captain Davis, of the artillery.

Mr. LITTAUER. I notice that the Secretary of War has recommended that the new 16-inch gun be placed upon a disappearing carriage; at least I read somewhere something to that effect. You have no purpose at present to manufacture more of those guns, have you?

General CROZIER. No, sir; there is no purpose at present to manufacture any more 16-inch guns.

Mr. LITTAUER. What do you expect to gain by placing this gun on a disappearing carriage in the way of experience and information? The cost would be tremendous, would it not?

General CROZIER. Yes; the cost would be great. The only thing we will gain will be the utilization of the gun which we already have. That will be the principal gain.

Mr. LITTAUER. What will it cost?

General CROZIER. Not less than \$100,000.

Mr. LITTAUER. The utilization of the gun you spoke of a minute ago will be simply comparatively greater efficiency by lowering and raising the gun on the disappearing carriage. It could be utilized on a permanent carriage, of course?

General CROZIER. Yes.

Mr. HEMENWAY. What kind of a carriage could you put it on?

General CROZIER. The way contemplated by the Endicott Board of

1885, of which you know, was that all 16-inch guns should be mounted in revolving turrets, in pairs, and no other method of mounting them has ever been considered. But on account of the great expense of these turrets, estimated to be—including guns, carriages, and everything—a million and a quarter dollars per turret, they have never formed part of any accepted project for the defense of the coasts in any of our appropriations; so this gun was left in the air without means of mounting. Now, it could be mounted on a simple barbette carriage, which would leave it exposed over the parapet.

Mr. LITTAUER. But its range is supposed to be so enormous that in action a vessel could not approach near enough to hurt it?

Mr. HEMENWAY. You can not see a vessel so far out at sea.

General CROZIER. That is not an important point in regard to these powerful guns. It is not that they will shoot farther than other guns but that they can hit harder. As a matter of fact they will shoot farther, but the main difficulty is to see. Our observations demonstrate that it is not worth while to use guns at a greater range than 5 miles and that range we can obtain with a lower-power gun of a smaller size; so the increased range is not regarded as an element of advantage, which is simply the increase of power.

Mr. GARDNER. That you hold as a general principle?

General CROZIER. Yes.

Mr. GARDNER. In defense the 20-mile gun is practically no good.

General CROZIER. The last 15 miles are practically of no use. It is not worth while sacrificing anything to get the remaining 15 miles after the first 5 miles have been secured.

Mr. HEMENWAY. To mount this gun upon a barbette carriage would leave it exposed?

General CROZIER. Would leave the gun itself and gunners completely exposed to fire, and would not be a good method. We have this single gun, and we wish to make such use of it as we may. That would be the method which could be followed in case this disappearing carriage we are now building for it should not prove a success.

Mr. HEMENWAY. What would it cost to mount it on a barbette?

General CROZIER. The carriage itself would cost about \$45,000.

Mr. HEMENWAY. So it costs double the amount mounted upon a disappearing carriage, and then you get the protection for both the gun and the cannoneers?

General CROZIER. For both the gun and the cannoneers.

Mr. LITTAUER. Is it contemplated to put all the 12-inch guns on disappearing carriages, or only those on lower or medium sites?

General CROZIER. Since the action of this board of which we spoke a moment ago it is in contemplation to put practically all on disappearing carriages. The board gives, as its opinion, that the height of the site does not affect the question.

Mr. LITTAUER. How many of those already in place of the larger guns are on barbettes and how many on disappearing carriages—what proportion?

General CROZIER. I think about 80 per cent, if not more, are on disappearing carriages.

Mr. HEMENWAY. For purchase, manufacture, alteration, issue, and repair of carriages, etc.?

General CROZIER. Yes; this armament has to be maintained. I will say we have had very little repair work to do on the armament since it was installed, but something of the kind is coming up all the time, and we should have it included here. I will say that the money that is

intended to be expended under this item, other than for manufacture, is not so much for repairs as it is for improvements. We are all the time improving these carriages. We are adding things to-day to make them more quickly handled and to facilitate the use of them by the artillery.

Mr. HEMENWAY. Then this new language you seek to add is for necessary improvements more than for repairs?

General CROZIER. Yes; I have here an estimate of that sum in detail.

Mr. LITTAUER. You do not have any repair in there at all?

General CROZIER. No; it is all alteration; but as we are likely to have repairs made all the time, we would like to have that in there also.

Mr. HEMENWAY. You could, under existing law, make alterations, but you think it necessary to put it in there?

General CROZIER. Yes, sir.

Mr. HEMENWAY. We will skip the next two items, which are fixed—

General CROZIER. I would like to speak of the one for equipping 12-inch seacoast carriages in service with electrical apparatus for retracting purposes. When these guns are used in target practice or against the enemy they retract themselves. The recoil brings them back in position for loading, but at drill that has to be done now by hand power upon all these guns we have installed. One of the improvements we have added is to do this by electrical power. All newly built carriages are supplied with electric power, and it adds very much to the smartness and quickness of the drill, and makes it much less irksome and burdensome and slow.

Mr. HEMENWAY. Are you familiar with the Cushing Island battery?

General CROZIER. I know where Cushing Island is, but there was no battery there when I inspected that harbor in 1898, so I do not know much about it.

Mr. HEMENWAY. You do not know anything about the location of the hotel on that island?

General CROZIER. No; I am not familiar with that.

Mr. HEMENWAY. We will pass page 12, on which items are suggested to go out, and also page 13, unless gentlemen want to ask some questions.

Mr. LITTAUER. I would like to ask a question in connection with page 13, in regard to the item for powders, projectiles, and explosives for reserve supply for cannon. The Board of Ordnance and Fortifications made a particular recommendation, did they not, that the supply of powders and projectiles should be in a certain proportion for each style of gun?

General CROZIER. Yes.

Mr. LITTAUER. Does this carry that out?

General CROZIER. This does not complete the programme. There is planned a certain number of rounds of ammunition for each one of the guns which we are to have in the service. We are working up to that reserve. This amount we have estimated for here will add to what we already have.

Mr. LITTAUER. Does that mean your estimate of \$250,000 will give that much?

General CROZIER. No; the full amount of the estimate, \$920,000.

Mr. HEMENWAY. I notice your note here says, "This sum will provide, with the powders and projectiles now on hand," etc. What have you now on hand?

General CROZIER. I will read you what we now have on hand.



Mr. HEMENWAY. Take the \$250,000 with the amount we have on hand or just give us again the amount you have on hand.

General CROZIER. I have on hand and under manufacture for 5 and 6 inch guns an average of about 150 rounds per gun. That is a little mixed up from the fact that during the Spanish war we purchased a number of rapid-fire guns of those calibers abroad and got a very good supply of ammunition with the guns, more than this reserve calls for, but for those which we have built ourselves we have less than the reserve calls for, so I give a sort of average for these 5 and 6 inch guns of about 150 rounds per gun. Now, for the 8-inch guns we have on hand of smokeless powder—I will only consider that, for we use up the other—38 rounds per gun; for the 10-inch guns, 26 rounds per gun; 12-inch guns, 27 rounds per gun, and mortars, 16 rounds. That is what we have on hand now.

Mr. HEMENWAY. That ammunition is stored where it can readily be gotten to the point where there was trouble?

General CROZIER. Yes; we expect to store a certain amount of it at the fortifications; 10 rounds per gun for the larger guns and a larger number for the smaller guns at each fortification, and the remainder will be stored at central places.

Mr. HEMENWAY. Then \$250,000 added for the purchase this year would be an ample provision against all possible trouble, would it not?

General CROZIER. Let me see what that will be, on the average. That would give us an increase for the larger guns of two or three rounds per gun and for the smaller guns an increase of about seven or eight rounds per gun.

Mr. HEMENWAY. But you already have a sufficient supply to put ten rounds for the large guns and a larger supply for the smaller guns, and then a great supply in reserve that could be taken to any point where there was likely to be danger?

General CROZIER. If you leave out that word "great" I should say, Yes; a fair supply.

Mr. HEMENWAY. Then we can buy powder very rapidly if we want to?

General CROZIER. Do not be so sure of that.

Mr. HEMENWAY. How many powder factories have we?

General CROZIER. We have four.

Mr. HEMENWAY. Where are they located?

General CROZIER. We have a pretty good capacity, but in accordance with the necessary methods of manufacture it takes something like four months to make the powder—no matter how small a quantity—because it takes about three months to dry it. You know all the power is practically pure gun cotton, nitro-cellulose. This gun cotton, which in its natural form looks like pieces of cotton goods or loose cotton, is soluble in a mixture of ether and alcohol. It dissolves in that solution into a kind of paste. While in the form of past we make it up into grains of the size and shape we wish. Then we have to get the ether and alcohol out again, and it takes about three months to dry it out, when we have a grain of pure gun cotton which instead of looking like cotton looks like glue. You have seen it?

Mr. HEMENWAY. Yes.

General CROZIER. There is where the delay in the process comes.

Mr. LITTAUER. And the projectile and the explosive take an equally long time to procure?

General CROZIER. They take a long time; the projectile plants are limited.

Mr. HEMENWAY. Following your suggestion here on the one-half estimate there is \$250,000?

General CROZIER. Yes; you will see it is much less than one-half of the full amount that I estimated for—less than one-third.

Mr. LITTAUER. Consequently your judgment in estimating for the half is you would not really need the full half of the original estimate for this item?

General CROZIER. It was this way: There were other items I have estimated for that are more essential. Therefore, I have cut that reserve more than I have felt justified in cutting some other things.

Mr. GARDNER. Suppose you did not use this ammunition, does it deteriorate perceptibly with time?

General CROZIER. Really, I am not in position to say that it does not. I will say that we do not yet know all about smokeless powder, but I should say positively that it deteriorates much less and much less easily than the charcoal powder which it has replaced. I will say, also, that we have here an estimate, and we have always an appropriation, for target practice, and we keep firing this powder away and replacing it, so that the identical powder that we buy for reserve is not kept indefinitely in reserve, although the amount we provide for reserve is kept indefinitely.

Mr. LITTAUER. Is not but a small proportionate amount of this item expended for powder, but the most expended for projectiles and explosives?

General CROZIER. No; let us take a sample gun. The 10-inch gun fires a charge of approximately 160 pounds of powder, which, at 70 cents a pound, is about \$112. The projectile for the 10-inch gun weighs 575 pounds; that which we provide for reserve costs, how much?

Captain BABBITT. Sixty-five dollars.

General CROZIER. Sixty-five dollars; that is not much more than half what the powder costs. Then we have to have a charge of explosive for the shell, which is something like 25 or 30 pounds on an average, and that costs, how much?

Captain BABBITT. Thirty-five cents a pound.

General CROZIER. Thirty-five cents a pound, and that would be \$7 or \$8. The projectile and explosive do not cost nearly as much as the powder charge, even for the armor-piercing projectiles.

Mr. HEMENWAY. On page 14, there is nothing there unless there are some questions to be asked. On page 15, there is nothing there unless there are some questions.

General CROZIER. At the bottom of the page there is an item for ammunition for artillery practice, etc. There you see we have lumped some appropriations which were before separate.

Mr. LITTAUER. Does this item give the amount that is available for general artillery practice?

General CROZIER. That is what that is intended for. There has been a scheme of artillery practice approved by the War Department. It carries 15 rounds per company for the heavy guns, 10 rounds per company for the larger size rapid-fire guns, 20 rounds per company for the small size rapid-fire guns, and a thousand rounds per company for the subcaliber tubes. Taking the number of companies which would practice with each size of gun in carrying out that plan and it results in this appropriation, which, however, includes a number of subcaliber tubes, which is an equipment for target practice and not an annual expenditure. Last year we had the subcaliber tubes and the ammunition for them in a separate appropriation, but as it is all for target practice I thought it would be better to bring it under the direct appropriation.

Mr. HEMENWAY. The \$240,000 will be sufficient?

General CROZIER. That is cutting it in two.

Mr. LITTAUER. That is giving you one-half the estimate right straight through.

General CROZIER. Well, it will cut that amount of practice down proportionately.

Mr. LITTAUER. Even though we cut down the amount allowed for guns and their emplacements, and all that, do you not think we should keep up this amount for practice?

General CROZIER. I have followed that plan in making the reduction of one-third. You will notice I have \$400,000 in place of \$515,000 in proposing to reduce this one-third; but when you cut it down as much as one-half there is new installation, which, I think, is so important as to necessitate a very large cut in the target practice. So this is less than one-half of the \$515,000, which constitutes the full estimate. I would take that largely out of the additional subcaliber tubes and leave as much for actual practice as possible, because I think that in the present status of our installation it is more important that the people should become familiar with and skillful in the use of what they have than that we should greatly increase the installation. I should be glad if you could see your way not to cut that item down to one-half.

Mr. HEMENWAY. The next item. If there are no questions on the page, we will go to page 17. I see you add there the words "instruments for practice."

General CROZIER. We have various appliances that are used to increase the accuracy of artillery practice. They are a class of mathematical instruments—compasses, dividers—instruments of that class.

Mr. LITTAUER. Are they known by you as "instruments for practice?"

General CROZIER. Yes, sir.

Mr. LITTAUER. That gives very little explanation without the words "range finders." It simply asks for "instruments for practice."

General CROZIER. It includes range finders. It includes various little relocating instruments, as we call them.

Mr. LITTAUER. The verbiage did not seem to me to convey very clearly the idea to lay members like ourselves.

General CROZIER. I suppose not. It requires some such explanation, but it is difficult to get an expression which will cover all the different kinds of instruments which are necessary. They require only a part of the needed \$100,000.

Mr. HEMENWAY. We will go to the next item, for material, power lathes, machinists' tools, and tools and implements for the use of battery mechanics, and tools for electrical power plants at the fortifications. You add the words "and tools for electrical power plants."

General CROZIER. Which we have to furnish. The electrical power plants at the different posts are installed by the Engineer Corps because that installation is an engineering operation; we are the mechanical department of the Army and we furnish those tools, etc., which are necessary to maintain them afterwards. It is similar to the work of an engineer after the architect has gotten through with a building; we take care of it because we are better equipped for the purpose.

Mr. LITTAUER. You must be fairly well supplied with the mountain guns we last year provided?

General CROZIER. Yes, sir.

Mr. LITTAUER. So this is not a particularly essential item?

General CROZIER. No, I can say it is not one of the most essential we have. This will provide a total of so many mountain guns, which would be a proportionate equipment for a force of 50,000 men. You gentlemen can perhaps think of a mountainous region where we may possibly have to send 50,000 men, and if we had those guns we would have a fair supply.

Mr. HEMENWAY. Go to page 19, if there are no questions there.

General CROZIER. You will notice there are several items there which are bunched from what they were last year and what they have been in preceding years. For instance, I have put these guns and their carriages together. Before, we had sometimes the situation of having an appropriation for guns and an appropriation for carriages and the two did not balance. We would get more carriages out of the appropriation for carriages than we would get guns out of the appropriation for guns. Now I have put them together and I hope you will be able to let it stand in that way.

Mr. HEMENWAY. Go to page 20, unless there is some question.

General CROZIER. I did not recommend that the words "steel breech-loading" should be left out, but they are just like the words "oil-tempered and annealed." They mean nothing. Of course the guns are all steel and all breech-loading.

Mr. HEMENWAY. Now we get to the Sandy Hook proving grounds.

Mr. LITTAUER. That is your active station?

General CROZIER. The most active one. No; I will not say that, but I will say it is the most professional one we have in the Department. Of course we do not employ nearly as many workmen as we do in some of the other places. For current expenses and maintenance we always try to get a little more money, but it has always been a failure. We always press the effort, because this is an active business and technical post, where our officers learn their business to a better extent than at any other establishment we have. It is the only absolutely indispensable establishment in the Ordnance Department. We could possibly get everything that we use manufactured, although at less advantage, by other people than ourselves, but we could not maintain the department and the defenses without a proving ground.

Mr. HEMENWAY. You had \$37,500 last year, and you ask by the revised estimate on the basis of one-half \$50,243 this year, an increase of \$13,000 over the items you have had heretofore.

General CROZIER. I do not know that I can say that the actual expenses have increased in that proportion, but I can say that the work would be \$13,000 better done if we had that much more money.

Mr. HEMENWAY. Now go to page 22.

Mr. LITTAUER. What is the change of that verbiage there?

General CROZIER. You mean the words "and such other services as the Secretary of War may deem necessary." I am not contemplating any other services of that class.

Mr. LITTAUER. So there is no reason why that should not come out?

General CROZIER. Or you can leave it in—

Mr. LITTAUER. We look upon that as dangerous unless there is some special necessity.

General CROZIER. Very well, then, it can be left out. I am not contemplating any other service than that mentioned in the wording which is not italicised.

Mr. HEMENWAY. On page 23 the usual appropriation is asked for replacing the plank roads by macadam. We gave you \$5,000 last year. What do you propose to do with the \$5,000 this year?

General CROZIER. To continue the work, and that is to run one more year. I mentioned last year that it would take \$15,000 and that if you would give me \$5,000 a year I would complete it in three years. This is the second \$5,000. The \$5,000 last year has been very advantageously expended, and the place has been greatly improved.

Mr. HEMENWAY. For one iron and brass foundry building, \$23,500. Your note explains that in full, does it?

General CROZIER. Yes; but I will say this in addition. There have been complaints from the vicinity of Watertown Arsenal as to buying its patterns from private parties rather than making them in its own carpenter shop. The carpenter shop is too contracted, as the note says. It would be advantageous to make our patterns, as we would get them in less time. In answer to those complaints I have stated that I did not think that we had anything to do with the relations between these employers and their employees; that we got these patterns as a result of competition, and awarded the work to the lowest bidder; but I added that the Department has made estimates for an increase of the pattern-making capacity of this arsenal, which, I think, is otherwise advantageous for the Government.

Mr. HEMENWAY. And this provision for one iron and brass foundry building is for that?

General CROZIER. We would use the present foundry building for a carpenter shop.

Mr. LITTAUER. And overcome every objection?

General CROZIER. And otherwise improve matters.

Mr. LITTAUER. In what way improve matters?

General CROZIER. It would be advantageous for us to make these patterns for ourselves. We could make them more quickly and control the work better, and we would not be subject to the troublesome and expensive delays which we encounter now.

Mr. LITTAUER. Would not that apply to everything you buy outside?

General CROZIER. No; it would apply to things of this sort. I will give you a little illustration: Suppose I send to Watertown Arsenal an order to build 15 6-inch gun carriages. Now, there are a good many patterns involved in building those carriages. If we get them outside, we have to wait until all the drawings are completed. Then we advertise for the patterns in a bunch. In our own arsenal, as fast as the drawing of any pattern is completed we can put it in operation, and gain all the time it would require to complete the whole set of drawings.

Mr. LITTAUER. That could be easily overcome by partial deliveries.

General CROZIER. We have to wait and advertise for the whole thing together.

Mr. LITTAUER. That is, thirty days?

General CROZIER. It is thirty days after we get prepared to advertise, after we get all the drawings for the patterns completed.

Mr. HEMENWAY. You have a House document here, No. 185, including these other items: Proving grounds, Sandy Hook, for improving range, construction of bombproofs, etc., \$4,000; for grading in front of battery and constructing foundations for velocity screen frames, \$4,000; for repairing the railroad track between Highland Beach and the proving grounds, \$14,900; for one double set of quarters for civilian employees, \$8,000.

General CROZIER. Yes; commencing with the first one, improving range, construction of bombproofs, etc., that is in the general line of improving our facilities for carrying on proof work, so as to do it

more quickly and to do it better. The next item, \$4,000, for grading in front of battery, etc.—you know what the term “velocity screens” means. We put up a wire screen which we shoot through in order to measure the velocity of the projectiles, and we are doing that all the time.

Now, those screens are set up on posts in the sand, and between the rounds the men have to go out and repair the screens. It is contemplated to put a little track upon which these screens will be mounted, and they can be run off to one side and run up in front of the gun much more quickly than can be done with the present arrangement. It will be an improvement which is worth the money. The railroad track is the one which leads down to Highland Beach, our railroad station, and over which most of our guns and carriages and projectiles and powder and coal and other freight which we use comes.

Mr. HEMENWAY. I understand by purchasing this railroad and keeping it in repair the Government saves a large sum of money?

General CROZIER. Yes, sir.

Mr. LITTAUER. Is that \$4,000 for a year for the repair of the railroad?

General CROZIER. Yes. That is for current repair, to keep it straight, and keep up the ballast, etc. This \$14,900 is for special repairs, to put in new ties and some new rails which are very necessary at the present time, and which will not be necessary next year or the year after or the year after.

Mr. HEMENWAY. The \$4,000 only keeps up the ordinary repairs?

General CROZIER. That is all.

Mr. LITTAUER. How long is that road?

General CROZIER. It is 6 miles. We carry most of our workmen back and forth on the road also, which prevents our having to provide quarters for them, as we used to do on the grounds, which was a great expense and annoyance. They run the workmen over in the morning and in the afternoon they carry them back. How many are there?

Captain BABBITT. About 75 in bad weather and 200 in the summer, in the operating season, when everything is going on. There are more than 6 miles with the sidings and switches.

General CROZIER. Including the sidings and switches it is more, but there are 6 miles of direct line, and of course we have to keep it all in order.

Mr. HEMENWAY. You ask for quarters for civilian employees, \$8,000?

General CROZIER. We have an appropriation for putting up a chemical laboratory at Sandy Hook Proving Grounds, principally in connection with powders and fuses and explosives and detonating compounds. We have now a small chemical laboratory at the Frankfort Arsenal which is intended to be replaced by this, and the force is to be moved over to Sandy Hook?

Mr. HEMENWAY. This to furnish quarters for them?

General CROZIER. It is intended to furnish quarters for them. I do not intend to carry that much further, if any. As I have just been saying, most of the employee force at Sandy Hook lives down at Highland Beach and is carried back and forth on this railroad. These houses are for people whose presence is more constantly necessary there, and of a class which should be made fairly comfortable, and this reasonable expenditure will give them comfortable houses at Sandy Hook. I do not intend to carry it any further. I do not intend that the people employed should live at the post if they can live

elsewhere, but after a good deal of consideration I think it is worth while in the case of these particular employees.

Mr. HEMENWAY. Here is another document, No. 128, for cast-steel top carriages for 12-inch mortars, \$40,000.

General CROZIER. The mortar carriages have been in the past made almost entirely of cast iron. We have recently increased the power of the mortars, principally by the use of the smokeless powder. Some of the cast-iron parts of the old carriages have been found too weak to develop the full power, but instead of replacing them by making a stronger carriage it has been found possible, and much more economical, to replace the parts upon which the greatest strain is brought by exactly similar parts of cast steel, and in that way they will have the strength sufficient to meet the increased power. The top carriage is one of these parts, and it is contemplated eventually to replace them all. It relieves us from the necessity of building new carriages to meet the increased power of the mortars.

Mr. HEMENWAY. You think it is necessary?

General CROZIER. I think it is necessary; yes.

Mr. HEMENWAY. The next item is the usual appropriation of the Board of Ordnance and Fortification. Is there any matter you desire to bring to the attention of the committee?

General CROZIER. I would like especially to call your attention to the appropriation for the field guns, on page 18 of the bill. You may know that we have recently adopted a new field gun to replace the 3.2 gun. We think we have an excellent gun and an excellent gun carriage. We have enough funds to procure 150 of these, and this estimate is for providing 60 additional.

The funds we have had heretofore were divided between guns and carriages, and not divided properly; so although we had money enough for 150 guns, we only had money enough for 129 vehicles, caissons, etc., so this estimate will provide not only 60 guns, but 81 vehicles, which will balance that up. I think that should not be reduced below what I have given here. I think you should give the full amount we have estimated, \$493,000, if you can. These are the guns for the mobile artillery, and they represent a very considerable advance over the present gun, particularly in the rapidity of fire. Any amount you can give up to the full amount will be very well placed.

Mr. HEMENWAY. \$265,000 was your estimate on the one-half basis?

General CROZIER. Yes. You see that is more than one-half of the full estimate. This is one of those which I have not cut down proportionately.

Mr. HEMENWAY. Anything else? If not, we are very much obliged to you, General.

General CROZIER. I think that is all.







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